



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
ENVIRONMENTAL RESPONSE TEAM  
Edison, New Jersey 08837

**MEMORANDUM**

June 23, 2010

**SUBJECT:** DeepWater Horizon Suspected Offshore Benzene Incident in Region 6

**FROM:** Brian G. Kovak  
Designated Safety, Health and Environmental Management Official  
Office of Solid Waste and Emergency Response

**TO:** Dana S. Tulis  
National Incident Coordinator  
Office of Emergency Management

**Determination**

The air monitoring conducted onboard the Ocean Veritas during the June 13-16, scientific cruise was performed by two ORD staff who were unfamiliar with the operation of the monitoring equipment. They were not trained on how to conduct air monitoring with hand held, real-time direct reading PID's. They received no specific training on how to operate the UltraRAE 3000 and sample for VOC's and benzene. This resulted in a series of problems that most likely biased the sample results. The instrument was improperly calibrated and zeroed and the sampling protocol was not followed. Since the instrument was not calibrated, monitoring results with the instrument are highly suspect and the data can not be validated. Therefore, the only conclusion that can be drawn is that the data is unreliable and should not be reported or used in the determination of occupational exposure assessments for benzene.

**Background and Review**

On June 13-16, 2010, EPA, ORD staff participated on an offshore, source control scientific cruise on the research vessel Ocean Veritas out of Port Fourchon, LA. The crew conducted sampling operations within the 5 mile control zone of the source (well head). Upon their return to port, the ORD staff reported to their management that they had to conduct their own air monitoring for VOC's and benzene, since an Industrial Hygiene air monitoring technician was not onboard the vessel to conduct air monitoring. They also alleged, that based on their own air monitoring, they had encountered elevated levels of benzene, above the OSHA Permissible Exposure Limit (PEL) of 1.0 ppm, in the source control zone during operational activities. On June 14, they reported benzene levels up to 8.8 ppm on the back deck of the vessel. On June 15, they reported benzene levels of up to 3.55 ppm on the nest area. On June 16, they reported the benzene levels did not exceed 0.5 ppm for longer than any 15 minute period.

ORD management reported this incident to their Safety and Health staff, who contacted me on June 17, for possible support since I was currently working in the Gulf Region with Region 4. I then notified OEM and was dispatched to Region 6 on June 18, to investigate the alleged incident as requested. Upon my arrival at the R6 Incident Command Post (ICP) in New Orleans, LA (NOLA), I met with Jim Staves and OSC Brandi Todd from R6, who were both familiar with the event. I interviewed both Jim and Brandi as well as David Dutton, lead BP IH for the Unified Command (UC). I obtained background information about the vessel, the information reported to the OSC's, the UC air monitoring protocol and the contact

phone numbers for the two ORD crew members who conducted the air monitoring on board the Ocean Veritas and who had initially reported the alleged benzene exposure.

After gathering information from staff at the NOLA ICP, I proceeded to the Houma ICP in LA, to continue my investigation. In Houma, I met with OSC Gary Moore. I interviewed Gary about the cruise and he introduced me to the UC Safety Staff at the Houma ICP. I met with Todd Jordan, OSHA's lead IH and also with several BP contract IH's from CTEH. Scott Skelton and Christine Millner of CTEH, described the air monitoring method used, the air sampling protocol, the instrument used to monitor for benzene and VOC's on offshore vessels and the training required for staff conducting the air monitoring.

The BP air sampling protocol requires that an Industrial Hygienist or IH technician conduct the air monitoring. The UltraRAE 3000, is used to perform the air monitoring for VOC's and benzene. It is a real-time, direct reading PID, which measures total VOC's and can be set-up to sample for benzene, with the proper lamp (9.8eV) and (RAE-Sep) benzene tubes from RAE Systems. It has a very specific series of operational steps that must be followed to properly operate the monitoring instrument to ensure good quality data is collected. CTEH has developed an internal SOP for the operation of the UltraRAE 3000. They use the SOP to train their IH staff and occasionally their subcontractor IH staff as needed. The manufacturer's instructions and the CTEH operational SOP for the UltraRAE 3000 both require that the instrument be calibrated with a standard benzene calibration gas of 5 ppm.

I contacted Daniel Heggem, who performed most of the air monitoring during the Cruise for a phone interview and I attempted to contact Melanie Frazier several times, who also assisted with the air monitoring, but she was unavailable. During my phone interview, Daniel indicated that he was concerned that they had to conduct their own air monitoring with the UltraRAE 3000. No one onboard the vessel was trained or experienced in operating air monitoring equipment. They did not receive any training or orientation on using the equipment. In addition, he stated that the previous crew members also had to conduct their own monitoring with untrained staff. When they tried to calibrate the instrument, there was no standard benzene calibration gas available however, they proceeded with the calibration. They also had no zero calibration gas (clean air) to use so, they selected a location on the bridge of the vessel which would provide the best chance for a "clean" air sample above the oil plume they were operating. This may have introduced VOC's into the instrument. In addition, no charcoal filter cap was available for use to remove any ambient VOC's during zeroing of the instrument with ambient air (as recommended). This step set the zero point on the instrument's calibration curve. The third step to introduce span gas was also not conducted, as no span gas standard was available for use. This may also have biased the span setting for the instrument.

I discussed the incident with Marshall Gray, Director, ORD's Safety, Health and Environmental Management Program. Marshall told me that he did talk with Melanie following her trip and that she indicated that she suspected the instrument wasn't calibrated or working correctly on the first day they conducted their air monitoring (the highest recorded levels) but she thought it was working better during the later part of the trip.

My discussions with the CTEH Industrial Hygiene staff and the OSHA Industrial Hygienist, all confirmed that not properly calibrating and zeroing the UltraRAE 3000, could bias the sampling and result in unreliable data being generated from the instrument, as it's calibration curves would not be properly set prior to sampling. In addition, Scott Skelton, CTEH Project Manager, informed that he had experienced the same problem recently, with UltraRAE 3000 data that had been collected from one of their safety contractors. He alleged that air monitoring technicians from "Total Safety" had also conducted air monitoring with the UltraRAE 3000 in the offshore control zone with improperly trained personnel who did not operate the instrument according to the air sampling SOP. Scott stated that following those incidents, he submitted a report to BP safety management, which resulted in a very similar scenario of alleged high benzene levels being reported by the Total Safety technicians, which were actually shown to be "total VOC's". Their corrective action was to offer training on how to use the instrument to those personnel. I asked for a copy of Scott's report. He also suggested that there were some operational issues noted with the particular UltraRAE 3000 instrument that the ORD staff had used and that one of his IH technicians,

Josh Etzkorn, had identified several issues with the instrument when he picked it up from the Ocean Veritas at the dock following the Cruise. I asked for Josh's notes but have not yet received them.

I also reviewed the personal monitoring data for the VOC exposure assessments conducted by CTEH IH staff to date. This involves use of passive monitoring with 3M Organic Vapor badges. They are worn by workers for their work shift on a single day and measure the actual time-weighted average (TWA) exposures experienced by the worker as opposed to using area grab samples that the real-time direct-reading instruments, such as the UltraRAE 3000 collect. A total of 1,240 TWA samples were collected to date. Upon their analysis, only 37 samples had detectable levels of benzene at or slightly above the limit of detection (0.1 ppm). Of these 37 samples, only two samples were above the limit of detection. One sample resulted in 0.11ppm. The second sample was 0.13 ppm. The remaining 1233 personal samples were all below the limit of detection for benzene. These samples were collected throughout the oil response area of concern and included personal sampling conducted offshore, near shore and for onshore operations. This indicates that to date, over exposure of workers to benzene has not occurred.

In conclusion, I offer the following observations:

1. No IH or IH technician was onboard the Ocean Veritas to conduct air monitoring.
2. ORD Staff did not have training on how to operate the air monitoring instrument properly.
3. They attempted to operate the instrument following the manufacturer's instruction manual.
4. The air monitoring protocol was not available and therefore, not followed.
5. They conducted improper calibration without benzene calibration gas.
6. They zeroed the instrument with ambient air from within the work zone - an atmosphere that could contain VOC's, without using the charcoal filter cap to remove any background VOC's.
7. They did not use span gas to set the instrument span.
8. They did not sample with a single benzene tube for each sample. Benzene tubes were used up to 4 times each to collect benzene samples (one per sample is the recommended procedure).
9. Their air monitoring results were reported as overexposures for benzene over the Action level and the OSHA PEL and the crew donned respirators.
10. ORD Staff did not have the safety training required to wear respiratory protection.
11. ORD Staff were not medically cleared to wear respirators.
12. ORD Staff were not fit tested, nor issued respirators to ensure a proper fit.

Due to the observations outlined above, I could not validate this data as being either accurate or reliable for the measurement of benzene exposure. The data was subject to improper calibration of the instrument and possible operator error. Since the instrument was not properly calibrated, monitoring results with the instrument are highly suspect and questionable at best. In addition, the data may also have been subject to potential breakthrough of VOC's through the benzene tubes, caused by multiple samples collected through single tubes. Since this was repeated several times, it may have caused a cumulative effect of saturation of the samples with VOC's while still in the benzene sampling mode. This may have resulted in total VOC's actually being detected and being reported as benzene.

In summary, I would consider the air monitoring data collected on this cruise as highly suspect and invalid. No QA/QC procedures were in place and there is no way to accurately validate this data, therefore the only conclusion that can be drawn is that the data is unreliable and should not be reported or used in the determination of worker occupational exposure assessments or to compare against occupational health standards for exposure to benzene.

cc: Sam Coleman  
Cynthia Sonich-Mullin  
Wesley Carpenter  
Dave Wright  
Marshall Gray